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Seismic Fragility Curves for Reinforced Concrete Shear Walls Used in Nuclear Facilities

2. AUTHOR(s)

Luis F. Ibarra and Biswajit Dasgupta

3. NAME OF CONFERENCE, LOCATION, AND DATE(s)

2nd Int'l Conference on Computational Methods in Structural Dynamics and Earthquake Engineering; 22-24 June 2009; Island of Rhodes, Greece

4. NAME OF PUBLICATION

Proceedings of the Conference

5. NAME AND ADDRESS OF THE PUBLISHER

IACM - International Center for Numerical Methods in Engineering
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An ECCOMAS Thematic Conference

COMPDYN 2009 is one of the Thematic Conferences of the European Community on Computational Methods in Applied Sciences (ECCOMAS) www.eccomas.org and a Special Interest Conference of the International Association for Computational Mechanics (IACM) www.iacm.info. It has also been promoted by the European Committee on Computational Solids and Structural Mechanics (ECSSM) of ECCOMAS.

Supporting Organizations

- European Association of Structural Dynamics (EASD)
- European Association of Earthquake Engineering (EAEE)
- Greek Association for Computational Mechanics (GRACM)
- National Technical University of Athens, Greece
- University of Cyprus, Nicosia, Cyprus
- University of Thessaly, Volos, Greece
- Technical University of Crete, Chania, Greece
- John Argyris Foundation

Registration Fees

The registration fees, with early registration applicable if received before 28 February 2009, are:

	Early	Late
Delegates	470€	550€
Students	250€	290€

The delegates fees will include: Conference Proceedings, attendance at all scientific sessions, coffee breaks, reception and banquet.

Social Programme

The social programme for delegates will include a reception and a banquet at a local place of interest. The social programme will not be included in the reduced student fee.

Accompanying Persons Programme

The accompanying persons programme features a full-day excursion to the magnificent Acropolis of Lindos, as well as a number of guided tours in the city of Rhodes and other sites of interest on the island.
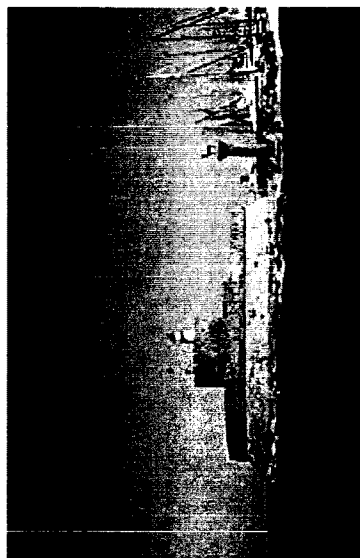
COMPDYN 2009
22-24 June 2009, Island of Rhodes, Greece

How to register and submit contributions

Authors are invited to submit their contributions on any of the conference topics. Submission of contributions and conference registration should be performed electronically via the conference web site:
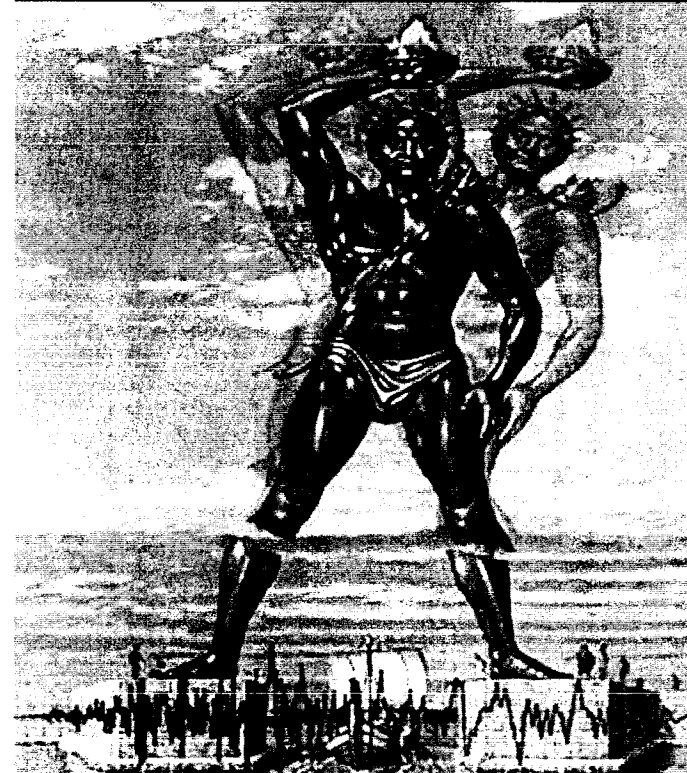
http://www.compdyn2009.org

ECCOMAS
Thematic Conference

COMPDYN 2009

2nd International Conference on
Computational Methods in
Structural Dynamics and
Earthquake Engineering

22-24 June 2009, Island of Rhodes, Greece

An IACM Special International Conference

http://www.compdyn2009.org

Objectives

The increasing necessity to solve complex problems in Structural Dynamics and Earthquake Engineering requires the development of new ideas and innovative methods for providing accurate numerical solutions in affordable computing times.

The purpose of the Conference is to bring together the scientific communities of Computational Mechanics, Structural Dynamics and Earthquake Engineering in an effort to facilitate the exchange of ideas in topics of mutual interests and to serve as a platform for establishing links between research groups with complementary activities. The communities of Structural Dynamics and Earthquake Engineering will benefit from this interaction, acquainting them with advanced computational methods and software tools which can highly assist in tackling complex problems in dynamic/seismic analysis and design, while also giving the Computational Mechanics community the opportunity to become more familiar with very important application areas of great social impact.

Conference Topics

The conference topics will include (the list is indicative):

- Numerical simulation methods for dynamic problems
- Nonlinear dynamics
- Solution strategies for dynamic equations
- Soft computing applications
- Optimum design in structural dynamics and earthquake engineering
- Parallel and distributed computing – Grid computing technologies
- Soil dynamics
- Geotechnical Earthquake Engineering
- Soil-structure interaction
- Dynamics of coupled problems
- Dynamics of micro and macro systems
- Impact dynamics
- Multi-scale dynamics
- Stochastic dynamics
- Reliability of dynamic systems
- Seismic risk and reliability analysis
- Constitutive modelling under earthquake loading
- Seismic isolation
- Repair and retrofit of structures
- Structural acoustics and vibro-acoustics
- Sound and Vibration
- Aeroelasticity
- Wave propagation
- Algorithms for structural health monitoring
- Inverse problems in structural dynamics

Location

The conference will take place on the historic island of Rhodes, Greece. Rhodes is considered an island that mixes the archaelogical and historical interest with the cosmopolitan way of life, as well as, the natural beauty and distinctive architecture, the warm and dry climate and its excellent cuisine. The various traditional, cultural, scemic features of Rhodes combined with its rich lecacy in archaelogical and historical treasures, constitute along with the unique character and traditions of the local people, an unforgettable place for recreation and travel.

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Important Dates

Deadline for presenting one page abstract **30 November 2008**
Acceptance of the paper **31 December 2008**
Deadline for submitting the final
contribution and early payment **28 February 2009**

Accommodation

Block reservations at reduced rates have been arranged at the conference hotel **Rodos Palace** and at a number of hotels conveniently located in the vicinity of the conference location. Information on these hotels and their rates are available at the Conference website.

Conference Secretariat

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This Conference is held simultaneously with the 2nd South-East European Conference on Computational Mechanics (SEECCM 2009) at the same venue.

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Computational Methods in Structural Dynamics and Earthquake Engineering
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SEISMIC FRAGILITY CURVES FOR REINFORCED CONCRETE SHEAR WALLS USED IN NUCLEAR FACILITIES

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The risk-informed, performance-based regulations establish seismic performance objectives for nuclear facilities that can be met if the probability of occurrence of a seismically initiated event sequence, leading to unacceptable performance, remains within specified limits. A seismic event sequence may result from failure of one or multiple structural or other systems. The probability of failure or unacceptable performance of a structural system is estimated by convolving the fragility curve for the evaluated failure mode and the corresponding seismic hazard curve. For evaluating probability of failure, fragility parameters are estimated by means of structural analyses and data collected from the literature.

This study evaluates the effect of fragility curves' generation on the probability of failure of nuclear facilities, which usually consist of reinforced concrete structures with thick low-rise shear walls as the main lateral resistance component. The study estimates the effects of parameter variation on the structural response of representative shear walls. The evaluated parameters include hysteretic energy dissipation capacity, structural damping, and those involving soil-structure interaction effects, among others. The parametric study is used to estimate the median capacity, High Confidence of Low Probability of Failure (HCLPF) capacity, and logarithmic standard deviation parameters for predefined failure modes of shear walls. The fragility curves are generated based on different capacity parameters (e.g., median and HCLPF capacity).

In addition, fragility information for eastern and western U.S. nuclear power plants is compiled from the available literature. The database includes several seismic probabilistic risk assessment analyses and provides fragility information on reinforced concrete structural components similar to those evaluated in this study. The upper and lower boundaries for fragility parameters are obtained from the structural assessment of representative shear walls and this literature survey. This information is used to compute the probability of failure or unacceptable performance of low-rise shear wall components for U.S. sites with different seismic hazards.

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